

Claims

1. A heating device having an electrical heating conductor arrangement (1.1), which is integrated into a flexible heating element (1) and can be connected to a supply voltage (UV) via a connector cable, a heating circuit (3) formed by the heating conductor arrangement and further elements, including a control member (THY1) for a heating current (iH), and a triggering circuit (2) with a control loop connected to the control member (3) for varying the heating current (iH) and regulating the temperature, wherein the control of the control member takes place as a function of a deviation between an actual value and a rated value,

characterized in that

the triggering circuit (2) is furthermore coupled via a coupling branch (5) to the heating circuit (3) for picking up an electrical measurement value (U21) -current or voltage - which is a function of the temperature of the heating conductor arrangement (2.1), and has a control loop with a digitizing stage (2.11) of a digital circuit arrangement (2.1), and

the triggering circuit (2) is embodied in such a way that the control of the control member (THY1) for regulating a set temperature of the heating element (1) takes place on the basis of data developed by the digitizing stage (2.11).

2. The heating device in accordance with claim 2,
characterized in that

the measured quantity (U21) is picked up by means of a voltage divider formed in the heating circuit (3), which is constituted on the one hand by means of the heating conductor arrangement (1.1) constituting a temperature-dependent resistor, and on the other hand by means of at least one resistor element (R21).

3. The heating device in accordance with claim 1 or 2,
characterized in that

the measured quantity (U21) is conducted indirectly or directly to the digitizing stage (2.11) via a feed branch (5) for developing a digital actual value.

4. The heating device in accordance with claim 3,
characterized in that

the measured quantity (U21) is supplied to an analog time function element arranged upstream of the digitizing stage (2.11) and having a resistor/capacitor circuit (R7, C6),

the digitizing stage (2.11) has a time-measuring element for developing the actual digital value, and that the actual digital value corresponds to an actual time value until a preset or presettable charge voltage of the capacitor (C6) has been reached,

in the digitizing stage (2.11) a rated time value is preset or is presettable as the rated value, and

for heating, the triggering of the control member (THY1) takes place as a function of the deviation of an actual time value from the rated time value.

5. The heating device in accordance with claim 4,
characterized in that

one connector of the capacitor (C6) is coupled via a charging resistor (R7) to a pole of the supply voltage (UV) and the other connector is coupled to the heating circuit (3) via the coupling branch (5), and

for detecting the measured quantity (U21) and developing the actual value the control member (THY1) is triggered by means of the digital circuit arrangement (2.1).

6. The heating device in accordance with claim 4 or 5,
characterized in that

the capacitor (C6) is connected to the supply voltage (UV) by a rectifier (D2).

7. The heating device in accordance with one of claims 4 to 6,
characterized in that

for developing the rated value the control member (THY1) is brought into its non-triggered state in which it interrupts the heating circuit, and the other connector of the capacitor (C6) is connected to a further voltage divider (8) for picking up a component voltage which can be set to correspond to a desired temperature and for developing the rated value from the component voltage.

8. The heating device in accordance with claim 7,
characterized in that

the pick-up of the component voltage takes place by means of a switching member (S3) which is temporarily triggered via the digital circuit arrangement (2.1), and
the developed rated value and/or the developed actual value is/are stored for performing a rated/actual value comparison in the digital circuit arrangement (2.1).

9. The heating device in accordance with one of the preceding claims,
characterized in that

the digital circuit arrangement (2.1) is designed for generating a reference value as the common reference value for the rated value and the actual value.

10. The heating device in accordance with claim 9,
characterized in that

for developing the reference value, the control member (THY1) and the switching member (S3) are placed in their interrupted state and the capacitor (C6), which is connected via the one or the other connector with the digital circuit arrangement (2.1), can be discharged by means of the latter for performing the reference measurement, and is subsequently charged via the charging branch (7), the coupling branch (5) and the resistor element (R21) of the heating circuit (3), and that in the process the time until the charge voltage of the capacitor (C6) has been reached, measured by means of the time-measuring member of the digital circuit arrangement (2.1), is stored as the reference value.

11. The heating device in accordance with claim 10,
characterized in that

the digital circuit arrangement (2.1) is embodied in such a way that, for temperature regulation, initially the reference value during a supply half-wave is determined and thereafter the rated value and the actual value are determined in the course of respective further half-waves, and the temperature is adjusted on the basis of a comparison of the rated value and the actual value and, following an intermission in which the triggering of the control member (THY1) is interrupted, the mentioned steps from the reference value development to the intermission time are cyclically repeated.